Eddy™ *means real-time*

Eddy Serial

User Guide

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Revision History

Revision Date	Document Version	Pages	Description
Feb-5-2009	2.1.0.1	All	Initial release by shlee

Table of Contents

Chapter 1.   Introduction

Eddy, SystemBase Embedded Device Server Module, is an optimized minimal CPU module for developing an industrial embedded device. This manual introduces general factions for the Eddy.

1.1   About this manual

This manual guides that users are able to develop Eddy for a device server including the function that transfers from serial data to LAN. Setting Eddy's configurations, status monitoring, firmware update, and other administration work are also included. H/W level integration and S/W setting information can also be found.

1.2   Who should read this manual

This guide is designed for Eddy users and administrators. It is strongly recommended that anyone trying to apply, use, and maintain Eddy read this document. It will be a great starting point for any administrator who wants to easily monitor and control Eddy and its connected devices.

1.3   Contents

Chapter 1. Introduction is a preface with general information and introductory notices.
Chapter 2. Getting Started gives a brief introduction to Eddy series, including features and applications.
Chapter 3. Hardware Descriptions explains the layout and pin specifications with block diagram and drawings.
Chapter 4. Integration assists you connecting Eddy to serial and network environment. It covers first time boot-up and status check procedures.
Chapter 5. Configuration via Web provides ways to configure and to connect Eddy via web browser.
Chapter 6. Configuration via Telnet provides commands and its explanation to configure and to connect Eddy via web Telnet.
Chapter 7. Appendix provides firmware update guides and detailed technical specifications.

1.4   Eddy Documents

The following table summarizes documents included in the Eddy document set.

Document	Description
Eddy Serial User Guide	Eddy's Configuration, and Management Information
Eddy DK Guide	Programmer's application development guide, including in-depth approach to compiling, linking, creating and uploading firmware API reference is included with a list of available functions for customized application programming
Portview User Manual	Guide for SystemBase device server management application Portview
COM Port Redirector User Manual	Guide for SystemBase COM Port Redirector
TestView User Manual	Guide for SystemBase test program TestView

General information on Eddy or embedded device servers can be obtained at our website at http://www.sysbas.com/. Latest documents, software and firmware downloads are available.
Other relevant documents are as follows:

Document	Description
Eddy Spec Sheet	Eddy specifications
Eddy White Paper	An introductory reading for anyone new to embedded device server, which focuses on background, history, market environment, and technology
Eddy Application Notes	Various applications of Eddy presented in diagrams and images

All documents are updated promptly, so check for the recent document updates. The contents in these documents are subject to change without a prior notice.

1.5   Technical Support

You can reach our tech support by following 3 ways;

1. Visit the Eddy official community site at http://www.embeddedmodule.com and go to 'Technical Support' menu. FAQ and questions can be reviewed and submitted.

2. E-mail our technical support team to tech@sysbas.com. Any kind of inquiries, requests, and comments are welcomed.

3. Call us at our customer center at 82-2-855-0501 for immediate support.

Our technical support team will kindly help you get over with the problem.

Chapter 2. Getting Started

Welcome to Eddy! This chapter includes Eddy series overview, main and distinctive features, package contents for each product, and application fields.

2.1 Overview

There are two categories in Eddy; Eddy-CPU module, Eddy Development Kit (DK).
The Eddy-CPU module includes default applications for serial and LAN communication, and supports plug-and-play features. By switching to the custom mode, users can program any application and upload it on to the module. This application then is executed on the module. In order to write and compile programmer's source code, Software Development Kit (SDK) LemonIDE^{TM} is required.
SDK is included in the DK package. Please refer to Programming Guide and LemonIDE^{TM} user's manual included in the Development Kit for detailed information on the SDK.
SDK is not necessary for users using Eddy in default presettings.

2.2 Eddy-CPU v2.1

Eddy-CPU is an embedded module based on ATMEL AT91SAM9260-CJ processor with 32MB SDRAM, 4MB or 8MB Flash Memory, 1 Ethernet port with 10/100Mbps, 16 bit address / 8 bit data bus interface supporting external device connection, and maximum 17 programmable IO pins. Programmers can easily implement any device drivers with referring to library type example codes and evaluation kit circuit diagrams.
Eddy-CPU is implemented on a small form factor (42 * 25mm) with on-board memory and integrated 10/100Mbps network interface. Developers can minimize time and cost spent on developing application products.
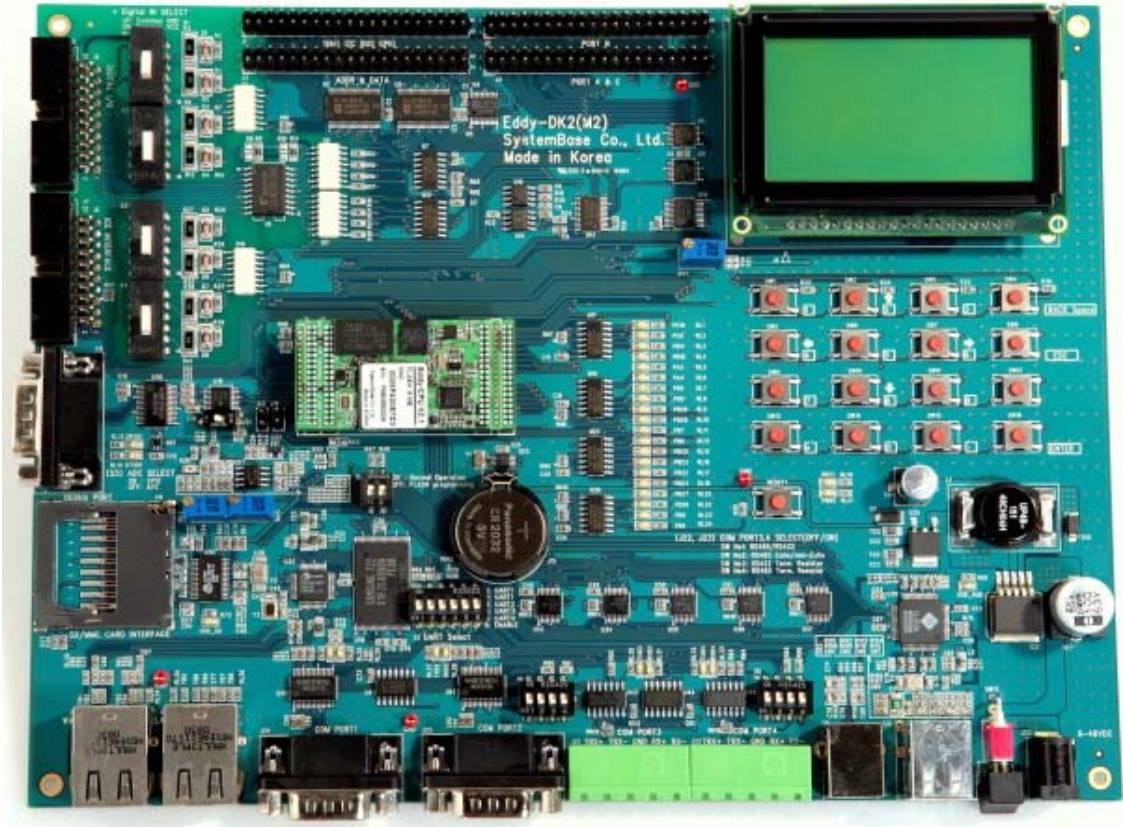
2.3 Eddy-CPU v2.1 Specifications

	Feature	Type
Hardware	CPU	ARM926EJ-S (210 MHz)
	Memory	8MB Data Flash, 32 MB SDRAM
	External I/F	19 Bit / 16 Bit Data Bus
	Ethernet I/F	10/100 Base-T Auto MDI/MDIX
	UARTs	4 Port, Support up to 921.6 Kbps (1 : Full Signal, 2,3,4, : RxD, TxD, RTS, CTS only)
	USB 2.0 FS	2 Host /1 Device Port, 2.0 FS (12Mbps)
	ADC	4-Channel 10 Bit ADC
	TWI(I2C)	Master, Multi-Master and Slave Mode
	SPI	8- to 16-bit Programmable Data Length Four External Peripheral Chip Selects
	GPIO	Max. 56 Programmable I/O Pins
	Power Input	3.3 V (200 mA Max)
	Dimensions	25 x 48.5 x 6.2 mm
	Weight	8.3 g
Network	Protocol	TCP, UDP, Telnet, ICMP, DHCP, TFTP, HTTP, SNMP 1&2, SSH, SSL
	Ethernet	10/100Mbps MAC / PHY
	Network Connection	Static IP, DHCP
Software	O/S	Lemonix Real Time Linux
	Mgt Tools	SNMP, Web, PortView
	Uploads	TFTP, FTP, Web
	Dev Tools	LemonIDE & SDK
Environmental	Operating Temp	-40 ~ 85 ℃
	Storage Temp	-60 ~ 150 ℃
	Humidity	5 ~ 95% Non-Condensing
Approvals	CE Class A, FCC Class A, RoHS compliant	

## 2.4 Eddy Development Kit v2.1 (Eddy DK)

Eddy Development Kit (Eddy DK) helps programmers to test and customize their own Eddy applications easily. The kit includes evaluation board, all necessary connectors, and programming environment with documentations and guidelines. Please refer to Eddy DK Manual included in the Development Kit for detailed information on the DK.

2.5　Eddy DK v2.1 Specifications

Feature	Type
NAND Flash	256MB, 8bit I/F
SD Card Connector	Push Type, Up to 16 GB MMC / SD Card / MC supported
USB Connector	1 x Device 2 x HOST, Dual-Port
LCD Module	128 x 64 Dots Matrix Structure
KEY	4 x 4 Matrix
Battery Holder	3V Lithium Battery, 235 mAh
LED	Power, Ready, 20 Programmable IO, Console & Serial TxD, RxD
I2C Interface	- 16bit I2C BUS GPIO - 256Kbit EEPROM
SPI Interface	1Kbit EEPROM
MCI Interface	SD Card, MMC Socket
ADC Interface	Temp / Light Sensor
Digital I/O	8 Port Input, 8 Port Output
Switch	- Serial or GPIO Select - RS422/485 Select - DIO : Common VCC or GND Select - Programming
Jumper Switch	Boot Mode Select, JTAG Select
Serial Port	2 x RS232 DB9 Male 2 x RS422/485 Terminal Block (RS422 & RS485 Selected by S/W)
Console Port	DB9 Male
LAN Port	2 x RJ45
ICE Port	Used for Flash Programming
Reset Button	Factory Default & Warm Boot
Input Power	9-48VDC
Dimensions	240 x 180 mm
CE Class A, FCC Class A, RoHS compliant	

2.6   Eddy Software Architecture
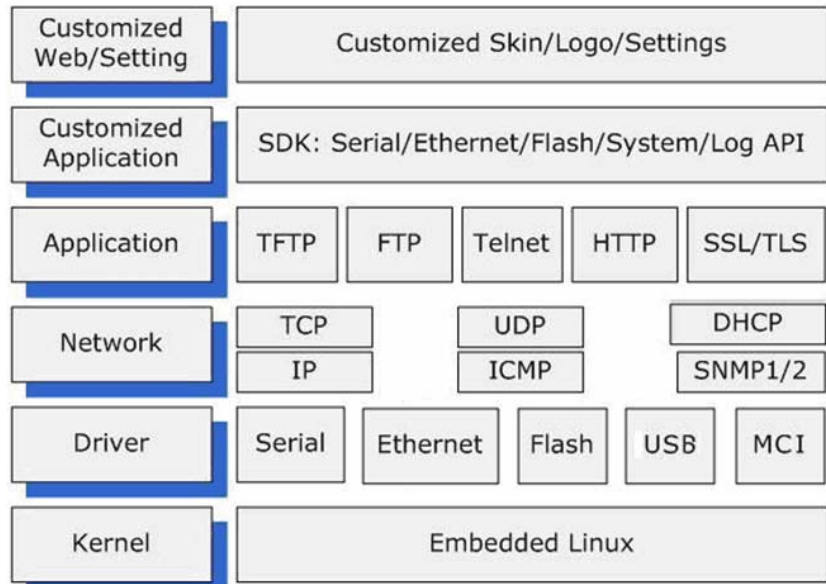
2.7   Main Features

Various features of Eddy make it a universal yet distinctive embedded solution.
Below lists main features of Eddy.

- Premium-level hardware with ARM9 210MHz CPU, 8MB Flash, and 32MB SDRAM
- Selectable RS232 only or RS422/485 combo interfaces
- USB host port (Max 12Mbps USB Full speed)
- SD Card Interface
- Max 921.6Kbps serial speed
- Program and run your own application
- SystemBase SDK and API support for application programming (included in Development Kit)
- Small size to fit in to any hardware
- 10/100Mbps Ethernet port (auto MDIX)
- SystemBase COM Port Redirector for better adaptability
- Extensive configuration and monitoring with Portview
- Firmware upload with Web, FTP, and TFTP
- Configuration with Web, Telnet, SNMP, and Portview
- Various customizing options
- Standard Linux environment for openness in executable applications
- Multiple Programmable IO pins for customized applications
- Watchdog timer support for monitoring the system and reset when system error is occurred.

2.8   Applications

Eddy can be applied to many practical applications in various fields. Some are presented below.

◆ **Factory / Industrial Automation**

PLC, Robot arms, Human-Machine Interface, Warehouse rails

Medical instruments, Inspection equipment controllers

Alarming units

◆ **Home Appliances / Electronic Devices**

Power controller, Gaming machines

Scales, Gas detection units, Water & pollution metering devices

Data collection and distribution units

◆ **Financial / Building Automation**

Card readers, Barcode scanners, Kiosks, Point-Of-Sale related devices

Serial printers, Cash registers, Credit card authorization terminals

Biometric detection units, Security devices

◆ **OEM Device Server Distributors**

OEM device server with distributor's own case & brand

Ready-to-go device or customized application / setup mode can be inserted

Chapter 3.   Hardware Description

This chapter provides Eddy's hardware information, including block diagram, layout, pin specifications, dimensions and other hardware-related issues.

3.1   Eddy-CPU

Ethernet port is provided as pin headers, and the transformer and RJ-45 connector should be manually implemented by users. (RJ-45 connector with embedded transformer, normally called LAN-Mate or MAC Jack, can be used as a simpler approach.
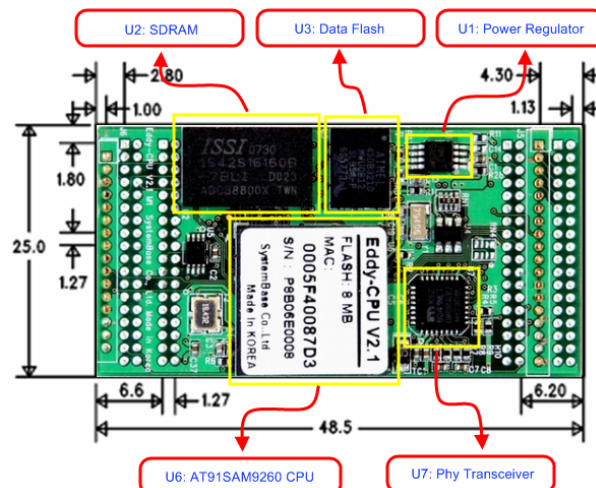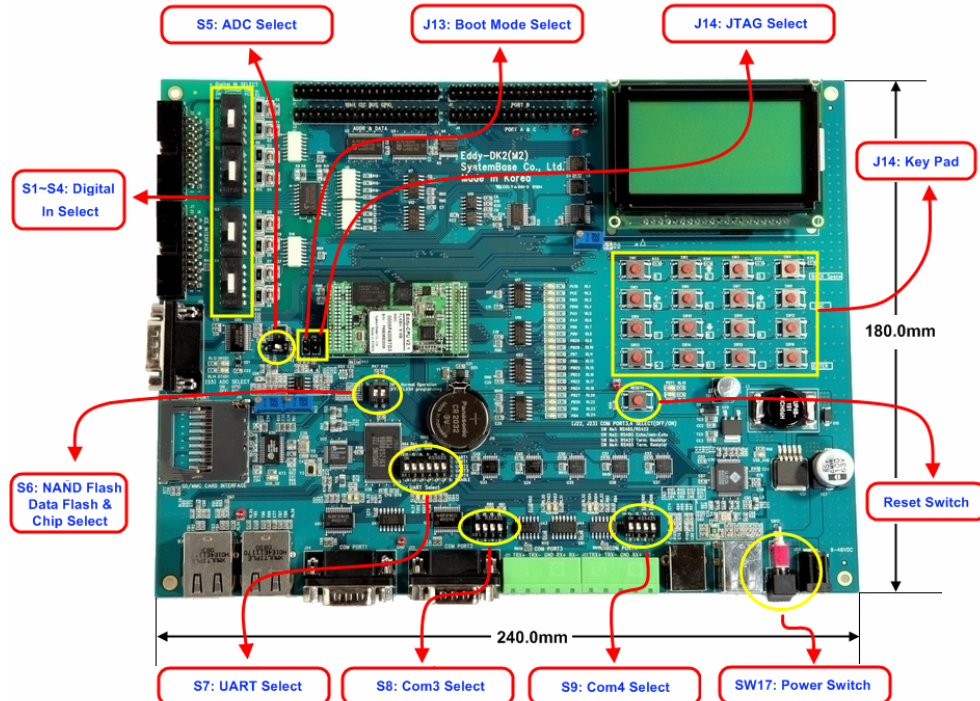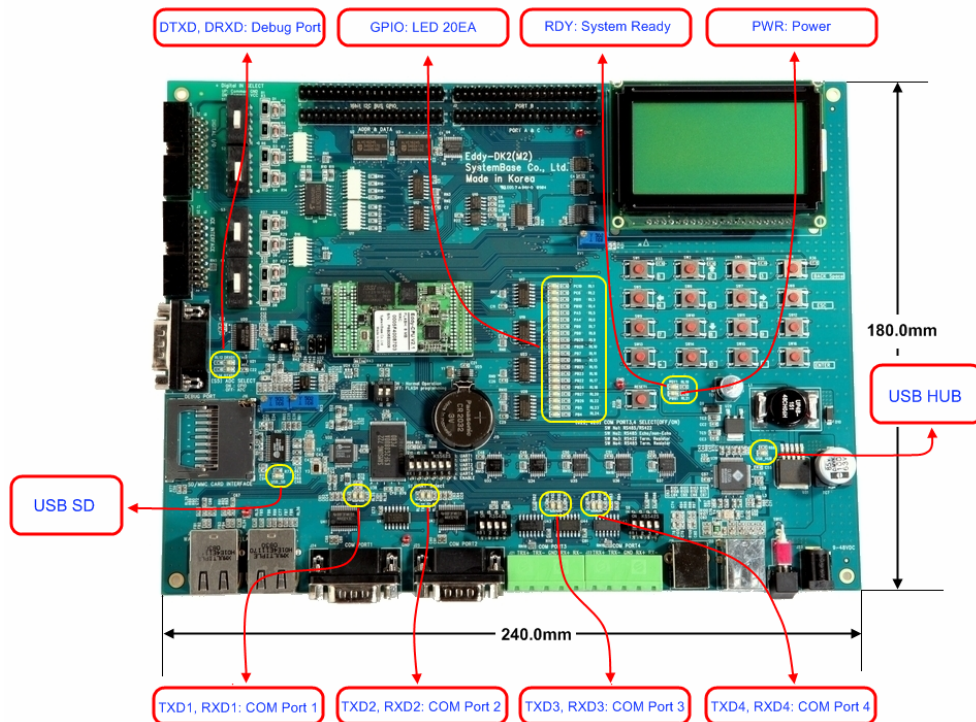
Eddy CPU V2.1 Device Discription
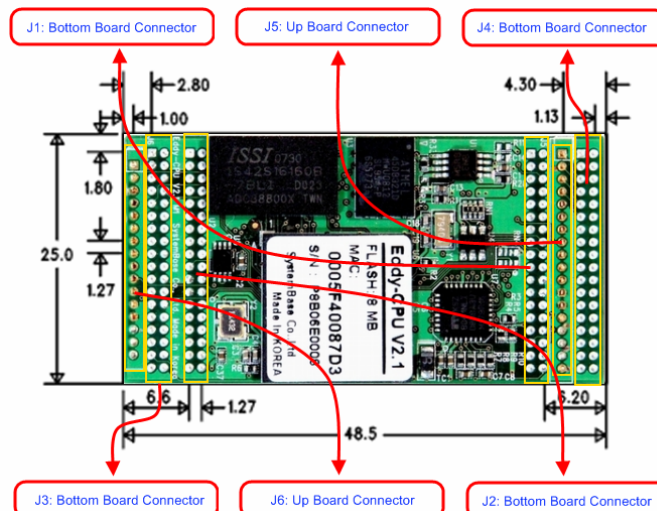
Eddy CPU V2.1 Connector Discription

3.2   Eddy DK v2.1

Eddy CPU v2.1 를 이용한 시험 및 개발환경을 제공하는 개발용 보드이며 각각의 Device, switch, pin, LED 등의 간략히 소개한다.

Switch Feature

LED Feature

J24: COM Port 1　　J25: COM Port 2　　J21: COM Port 3　　J22: COM Port 4

180.0mm

240.0mm

J17: WAN　　J18: LAN　　J20: USB Device　　J20: USB Host　　J23: Power Jack

External Device Feature A

J3: ADDR& DATA　　J1: I2C Bus GPIO　　J4: Port A&C　　J2: Port B　　J6: G-LCD Panel

180.0mm

240.0mm

J16: SD/MMC Card　　J12: Debug Port　　J7: ICE Interface　　J5: Digital I/O Port
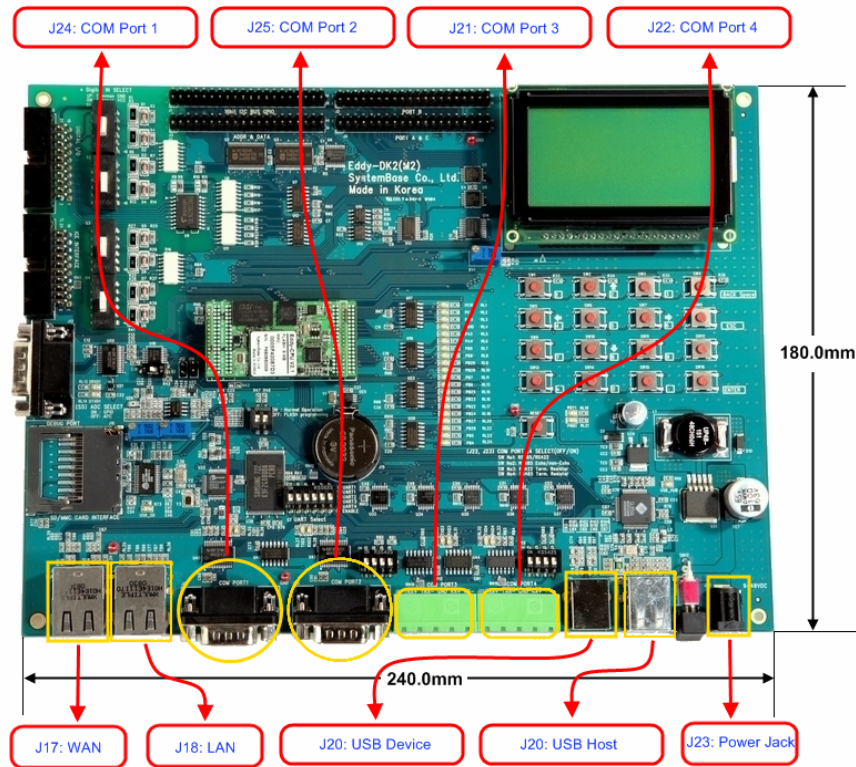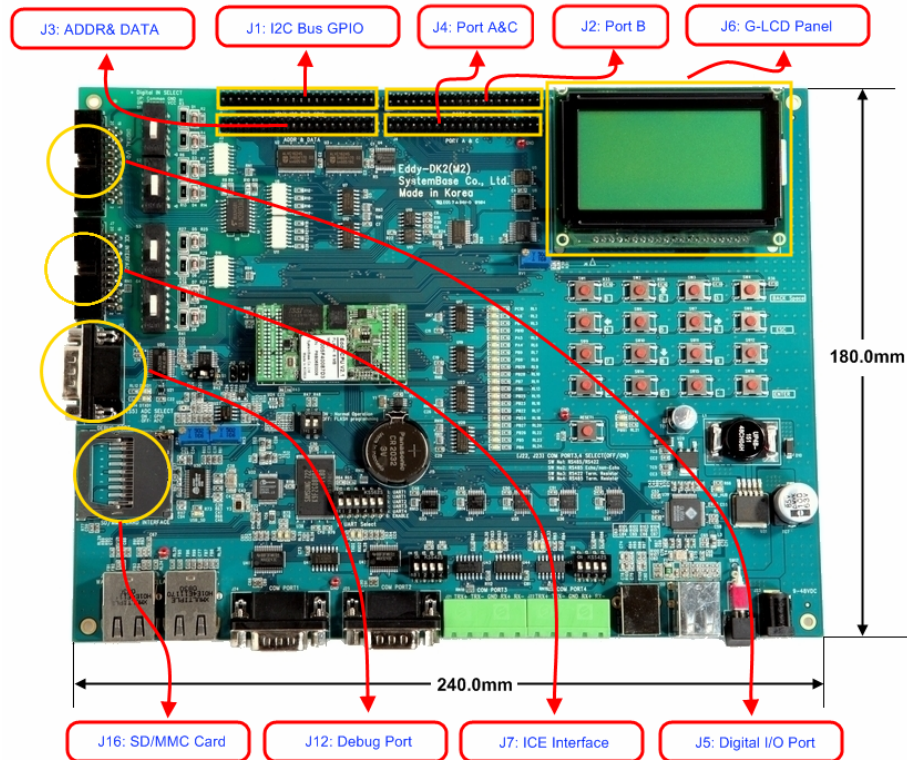
External Device Feature B

16

Internal Device Feature

Chapter 4.   Integration

This chapter explains how you can make Eddy to communicate. It deals with LAN and pin header connection guides for Eddy to operate together with the target serial device.
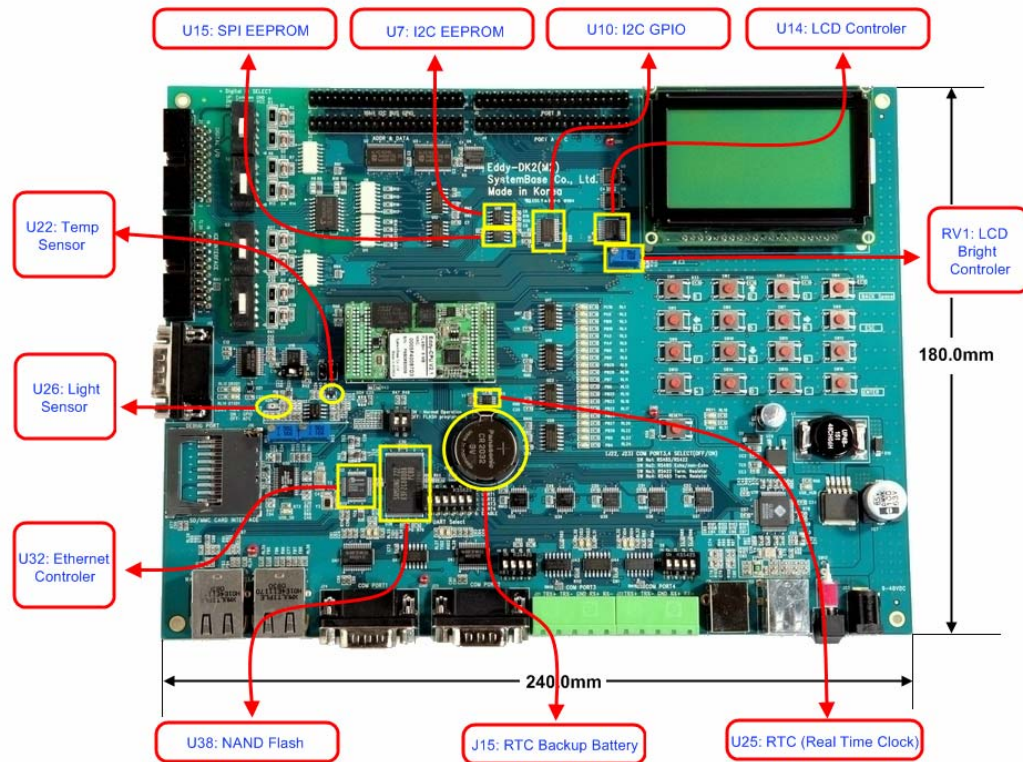Follow these steps to connect Eddy to the device and network.

4.1   Connection Guide

1) WAN/LAN

In order to connect Eddy to network, you need to use RJ45 Ethernet port. It supports both 10Mbps and 100Mbps Ethernet connection (auto-sensing). Since Eddy's LAN port supports MDIX function, you can either connect cross LAN cable or direct LAN cable. Plug one end of a LAN cable to Eddy and the other end to a hub, switch, or any other network device that can provide you with network access.

2) DB9

For the model included a DB9 serial port, you can simply connect Eddy to the destination serial device with a DB9 cable. For pin specifications, please refer to Chapter 3.

3) MCI slot

MMC and SDCards excepting T-Flash, Micro SD, and SDHC can be used through MCI slot. It provides Maximum 2 GBytes. Please note that MCI and SDCard must be inserted before power is induced to Eddy module.

2) USB Host

An USB memory stick or USB hub can be attached to Eddy-S2M/PIN module's USB host port. For an USB Hub it should have own power.

4.2   First-time Bootup

First of all, please make sure the power input you supply to the module is corresponding with the Eddy model that you have. If an appropriate power input has been successfully supplied, Eddy will power on and start booting.
Although there is no power LED to check the status, you can check by LEDs on the RJ45 Ethernet port. LED status operation is described in Chapter 3. Hardware Description.

An IP address is required to access Eddy's web interface or telnet command-line configuration tool. By factory default, Eddy is assigned a static IP address. After the initial connection, you can either manually assign a different IP address or set Eddy to automatically get an IP address from a DHCP server. While this depends on your network environment and policy, it is strongly recommended that you assign Eddy with a unique static IP.

4.3   Connecting to Eddy with IP address

In order to view current Eddy's settings or modify them, you need to make a Web or Telnet connection to Eddy. IP address is required information to make a connection.
There are two ways you can know the current IP address of Eddy.
First is to use a built-in, alias IP address of "10.10.1.1".
Second is to use "Detector" application provided in the Utility & Documents CD. This application allows searching for Eddy modules on the network.

◆ **The factory default IP address:**   **192.168.0.223**
Eddy's default IP address is set to 192.168.0.223. In order to connect with this address, you need to change network configurations so that your PC can connect to the IP 192.168.0.223. Please refer to an example below, and note that values don't necessarily have to be identical to the example below.
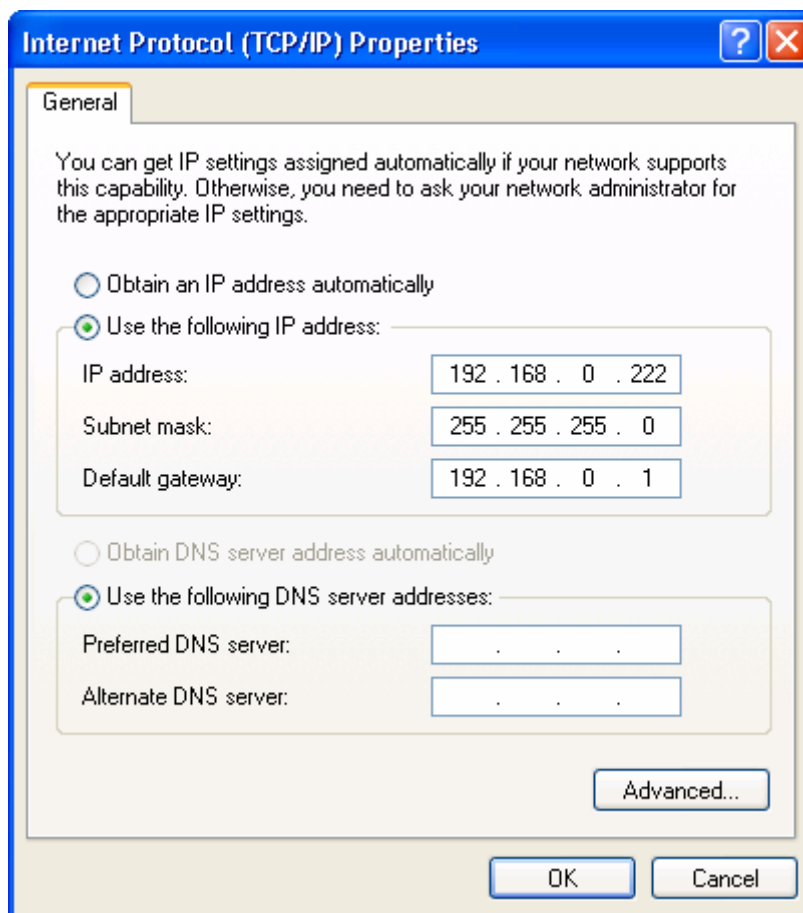
◆ **Factory default alias IP address: 10.10.1.1**

In case you configure Eddy to use DHCP to obtain an IP address automatically, you might find it hard to know the IP address to connect to. To provide users with an easier way to know the current IP address, Eddy has a fixed alias IP that is always accessible. Use the address below whenever you cannot find out Eddy's IP address.

In order to connect with this address, you need to change network configurations so that your PC can connect to the IP 10.10.1.1. Please refer to an example below, and note that values do not necessarily have to be identical to the example below.
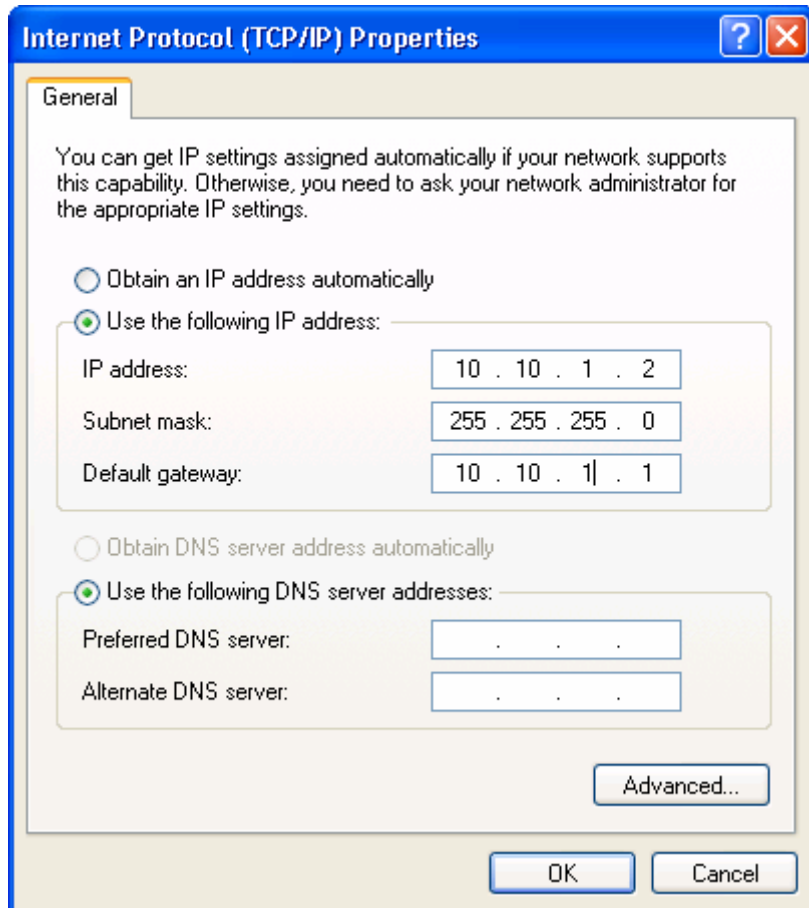
◆ **Connection via Detector**

By running the Detector program in the Utility & Documents CD included in the Eddy package, you can dynamically search for all Eddy modules on the network and connect to any module. (For more information on Detector, please refer to the Portview manual in the Utility & Documents CD included in the Eddy package)

After running Detector, click Search button on the top-left to display all Eddy modules on the network. Select the module that you would make a connection to, and click Telnet or Web to connect to the module via Telnet or Web, respectively.
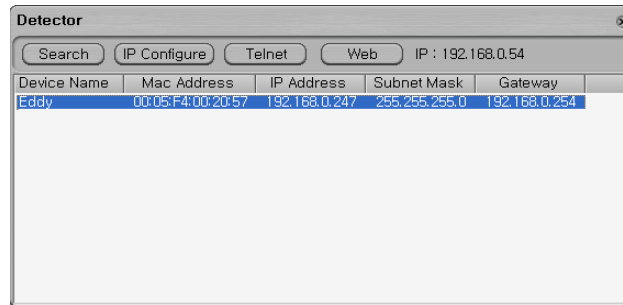
If Eddy module is not on the same network as the PC you are working on, use "IP Configure" button to temporarily assign an IP address that you would like to make a Web or Telnet connection to. If you assign a temporary IP address to Eddy, you need to to change the IP address and restart in Web or Telnet.
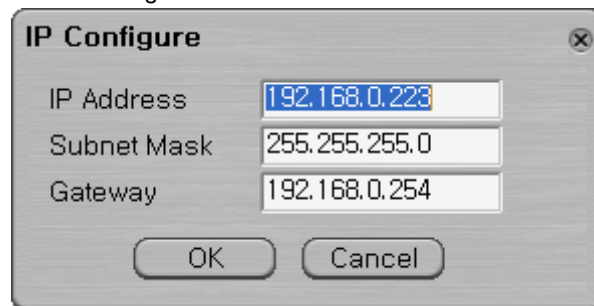
Now you are ready to connect to Eddy! There are three options to configure Eddy.

1) Web

You can easily configure Eddy with web interface, accessible from any web browser. For more information, please refer to Chapter 5. Configuration via Web.

2) Telnet

You can configure Eddy with commands after accessing Eddy through Telnet. For more information, please refer to Chapter 6. Configuration via Telnet.

3) Portview

You can use a Windows-based utility Portview from SystemBase to monitor Eddy. For more information on using the utility for your administration purpose, please refer to Portview User Guide.

4.4 Using MCI slot & USB Host Port

The following contents outline the usage of Eddy's MCI & USB Host Port.

Using MCI slot

MMC and SDCards can be used through MCI slot.

Please note that MCI and SDCard must be inserted before power is induced to Eddy.

MMC or SDCards are automatically recognized as a new disk space in " /tmp/mmc " folder. If memory card is not inserted to the MCI slot, " /tmp/mmc " folder will not be created.

To check memory card's current disk space information, type in "du -sk /tmp/mmc" or "df /tmp/mmc" commands via telnet. Following example displays status of a memory card with 1GB memory storage capacity.

```
Eddy login: eddy
Password:
# pwd
/tmp
# ls
ifstate     login.pw    thttpd.log  wtmp
login.id    mmc         thttpd.pid
# du -sk /tmp/mmc
9520    /tmp/mmc
# df /tmp/mmc
Filesystem              Size      Used Available Use% Mounted on
/dev/sda1               967.2M    9.3M   957.9M   1% /tmp/mmc
#
```

Using USB host port

An USB memory stick or USB hub can be attached to Eddy module's USB host port. If other USB devices are to be attached to this port, device drivers for the devices must be first created and loaded to Eddy-S2M/PIN module using Eddy-DK.

Following example displays procedures for USB memory stick usage.

Insert the USB memory stick to USB host port and connect telnet.

Type in "fdisk -l " or "ls -al /dev/sd* " command to check USB memory stick is properly inserted.

Create a folder using "mkdir /tmp/usb" command.

Mount "/tmp/usb" folder using "mount -t vfat /dev/sda1 /tmp/usb" command.

Always unmount USB memory stick with "umount 〈mounted folder〉 " command, before removing USB memory stick from USB host port.

If more than one USB memory stick is connected using a USB hub, each memory stick would be recognized as /dev/sdb1, /dev/sdc1, /dev/sdd1···. Each device must be mounted for proper use. Following displays an example of two USB memory stick connection with a hub.

```
Eddy login: eddy
Password:
# fdisk -l
Disk /dev/sda: 1014 MB, 1014497280 bytes
44 heads, 32 sectors/track, 1407 cylinders
Units = cylinders of 1408 * 512 = 720896 bytes
    Device Boot        Start         End       Blocks   Id System
/dev/sda1               1           1408       990704    6 FAT16
Disk /dev/sdb: 4068 MB, 4068474880 bytes
51 heads, 50 sectors/track, 3116 cylinders
Units = cylinders of 2550 * 512 = 1305600 bytes
    Device Boot        Start         End       Blocks   Id System
/dev/sdb1               1           3117      3973116    b Win95 FAT32
# ls -al /dev/sd*
brw-rw----    1 root      root       8,    0 Jan   1 00:04 /dev/sda
brw-rw----    1 root      root       8,    1 Jan   1 00:04 /dev/sda1
brw-rw----    1 root      root       8,    2 Jan   1 00:04 /dev/sdb
brw-rw----    1 root      root       8,    3 Jan   1 00:04 /dev/sdb1
# ls -l
-rw-r--r--    1 root      root          16 Jan   1 00:00 ifstate
-rw-rw-rw-    1 root      root           4 Jan   1 00:00 login.id
-rw-rw-rw-    1 root      root           8 Jan   1 00:00 login.pw
drwxr-xr-x    2 root      root       16384 Jan   1 00:00 mmc
-rw-r--r--    1 root      root           0 Jan   1 00:00 thttpd.log
-rw-r--r--    1 root      root           4 Jan   1 00:00 thttpd.pid
-rw-r--r--    1 root      root         768 Jan   1 00:05 wtmp
# pwd
/tmp
# mkdir usb1
# mount -t vfat /dev/sdb1 usb1
# df /tmp/usb1
Filesystem              Size       Used Available Use% Mounted on
/dev/sdb1               3.8G       3.0G    768.3M  80% /tmp/usb1
#
```
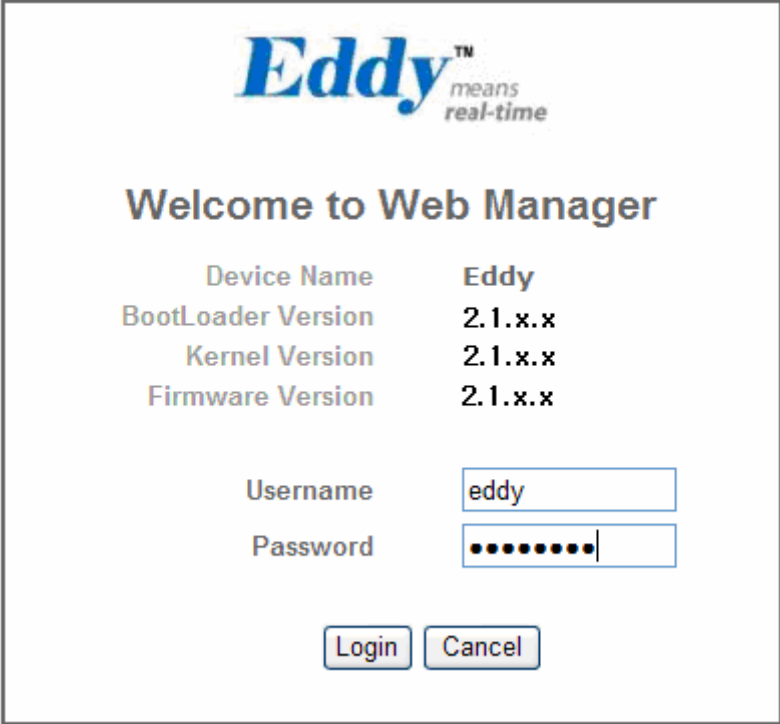
Chapter 5.   Configuration via Web

5.1   Connection

Open your favorite web browser and enter the IP address of Eddy to access Eddy's web manager. Once you are successfully connected, the following front page will show up. You need to enter appropriate username and password to login. Please note that this username and password is used as authentication method for Telnet as well.

◆ Factory default username: eddy
◆ Factory default password: 99999999

5.2 Setup Menu

If login process is successful, you will see a web manager's main page, showing summary of your device. On the left, you will see a setup menu, and you can navigate through these options.

Main features of Setup Menu are as follows.

Menu	Descriptions
Summary	View a summary of Eddy.
Network Settings	Configure network connection settings.
Peripheral Settings	Select GPIO or Device mode.
Serial Settings	Configure detailed operation environment for serial communication.
GPIO Settings	Configure programmable I/O pins.
DIO Settings	Configure DIO port.
SNMP Settings	Configure detailed operation environment for SNMP.
Change Password	Change ID and password for both Web and Telnet interface.
Update Firmware	Update Eddy's firmware.
Factory Default	Restore all the factory default settings.
Save & Reboot	Save the configurations and reboot Eddy.

5.3   Network Settings

Configure general network environment and network management. After changing values, you need to click 'Submit' button. Then you will see the same page with modified values. Please note that you have to 'Save & Reboot' in order to see these changes in effect. Changes will be discarded if you do not save current settings.

Main features for WAN Configuration is as follows.

Menu	Default	Descriptions
Device Name	Eddy	Name of the current device
Line Type	Static IP	IP obtaining method for Eddy's network connection.
IP Address	192.168.0.223	Current IP address Eddy is assigned to. (When line type is Static IP, manually enter an appropriate IP address. When line type is DHCP, current IP is displayed, but it is not editable.)
Subnet Mask	255.255.255.0	Current subnet mask Eddy is assigned to. (When line type is Static IP, manually enter an appropriate subnet mask. When line type is DHCP, current subnet mask is displayed, but it is not editable.)
Gateway	192.168.0.254	Current default gateway Eddy is assigned to (When line type is Static IP, manually enter an appropriate default gateway. When line type is DHCP, current default gateway is displayed, but it is not editable.)..
DNS	168.126.63.1	Domain Name Service IP address

Main features for LAN Configuration is as follows.

Menu	Default	Descriptions
DHCP Server	Enable	Enable or disable DHCP server.
IP Address	10.10.1.1	Current IP address for LAN is assigned to.
Subnet Mask	255.255.255.0	Current subnet mask for LAN is assigned to.
Lease Start Address	10.10.1.2	If DHCP server is enabled, start address of the DHCP scope for leasing.
Lease End Address	10.10.1.30	If DHCP server is enabled, end address of the DHCP scope for leasing.
Lease Time	180	DHCP lease time.

Main features for Network Service Configuration are as follows.

Menu	Default	Descriptions
Portview IP / Port	0.0.0.0 / 4000	Set the IP address and the port number of the PC where Portview is installed. For more information on Portview, please refer to the Portview User Manual. If IP is set to 0.0.0.0, this feature is disabled
DDNS (Username/ Password)	203.32.117.1	Register DDNS server's IP address for DDNS service. DDNS service used in Eddy is supported by http://ddns.nu default ID is eddy and default password is 99999999 if you want to used this ,you should register your own in

		http://ddns.nu
Telnet Service	Enable	Enable or disable Telnet service. If disabled, you cannot connect to Eddy via Telnet.
FTP Service	Enable	Enable or disable FTP service. If disabled, you cannot connect to Eddy via FTP.
Web Service	Enable	Enable or disable Web service. If disabled, you cannot connect to Eddy via Web.
SSH Service	Disable	Enable or disable Secure Shell service.
LemonIDE Target Agent	Disable	Enable or disable remote debugging function used by Eddy development environment, LemonIDE. For more information, please refer to LemonIDE user manual in the SDK CD included in Eddy-DK package.

5.4   Serial Settings

You can set the communication and operation environment for the serial port. After changing values, you need to click 'Submit' button. Then you will see the same page with modified values. Please note that you have to 'Save & Reboot' in order to see these changes in effect. Changes will be discarded if you do not save current settings.

Menu	Default	Descriptions
Operation Mode	COM	Select the operation protocol, which the serial port would use. **Disable** Do not use this port. **COM** Use the serial port of Eddy as the COM ports of Windows 2000/XP/2003/Vista operated PC. **TCP Server** Eddy works as a socket server, waiting for the client connection on the network. Socket number for awaiting connections can be set in 'Local socket port' field. All data between the socket and the serial port is transferred untouched after the socket connection is established.

Menu	Default	Descriptions
		TCP Client Eddy acts as a socket client in this mode. It tries to connect to the server IP address and the socket number assigned when a certain server waits for connection on the network. All data between the socket and the serial port is transferred untouched after the socket connection is established. **TCP Broadcast** Eddy works as a server, accepting up to 5 simultaneous connections from socket clients. Data transmitted from Eddy is broadcast to each socket client. **TCP Multiplex** Eddy works as a server, accepting up to 5 simultaneous connections from socket clients. The difference between TCP Broadcast and TCP Multiplex is that Multiplex allows each socket to communicate exclusively. That is, serial data in response are only transferred to the sender socket. **UDP Server** Eddy works as a UDP server, waiting for UDP connection from the client on the network. Socket number for awaiting connections can be set in 'Local socket port' field. Once a UDP packet is received to the socket that waits for the connection, the data is transmitted to the serial port. The data input from the serial port is put into UDP packets, which eventually are sent to the client. **UDP Client** When the data is input to the serial port, UDP packets are sent using the preset IP address and the socket number of the server.
Local Socket Port	4001	Set the socket number for the port. TCP server and UDP server operation mode makes use of this port for awaiting network socket connections.
Port Alias	Port1	Port alias name for convenience. 16 Characters at maximum.
Baud Rate	9600 bps	Set communication speed. (Options: 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600 bps)
Data Bits	8	Set the number of bits in each character size. (Options: 5, 6, 7, 8)
Stop Bits	1	Set the number of stop bits. (Options: 1, 2)
Parity	None	Set parity bit check scheme. (Options: None, Odd, Even)

Menu	Default	Descriptions
Flow Control	None	Set the flow control scheme. (Options: None, Xon/Xoff, RTS/CTS)
Device Type	DataOnly	Set the signal line checking method for the device to be connected to the given serial port. If the mode is set to Data Only, only Txd, Rxd, and Gnd signal lines are used in inter-device communication. If the mode is set to Modem Signals, all modem signals except RI(Ring Indicator) are asserted, tested, and used in communication. (Options: Data Only, Modem Signals)
Remote IP Address / Port	0.0.0.0 / 4000	When the Operation Mode is either TCP Client or UDP Client, set the IP address and the socket number to connect to..
Keepalive Check Time	0	After a certain amount of time passes without any communication after the socket connection between the given serial port and the server is established, automatically disconnect the socket connection. Valid from 0 to 32767 sec. For example, if the operation mode is set to TCP Server and Alive Check Time is configured to 10, TCP Server will listen for the client's connection and eventually establish a connection. Since the check time is 10 seconds, the server will wait for 10 seconds until the client connected to it sends any packet. If there is no data for 10 seconds, server will quit the connection and return to the listening state. This option is helpful in preventing communication obstacles that occur when either Eddy or the client quits unexpectedly (i.e. Sudden black out, reboot, LAN cable cut, etc.). In these cases, the other part of communication might not recognize the failure of its partner. Such misunderstanding can cause communication errors. If the value is set to 0, this function is disabled. Once connected socket will be retained until explicitly disconnected. (Only applies to TCP Client, TCP Server, TCP Broadcast, and TCP Multiplex operation modes.)
Latency Time	0	This needs to be set when consecutive data from the given serial port needs to be transmitted to socket at once. For example, if 100 bytes of character string are to be transmitted from the serial device to a server through Eddy, bypass is set to 0 for the latency time. Although it provides immediate sending through Eddy, the server could be received a lot parts of divided packets. If the latency time is not 0, Eddy will wait for the time and check new data. If there is new data, Eddy repeatedly wait for the time. Otherwise, Eddy will transfer the buffered data, but it could not run in real time.

Menu	Default	Descriptions
Port Login	Disable	When the Operation Mode is set to TCP Server, ask for the username and password when the client tries to connect (Options: Enable, Disable)
Passive Username	eddy	When the Operation Mode is set to TCP Server, set the username to ask for. 16 Characters at maximum.
Passive Password	99999999	When the Operation Mode is set as TCP Server, set the password to ask for. 16 Characters at maximum.

5.5 Peripheral Settings

Configure operation mode and output value for each Programmable I/O pins.
Eddy includes GPIO pins that output 3.3V or detect 3.3V signals.
Eddy-CPU provides 56 GPIO ports, if you only use WAN port.
You can detect either any 3.3V signals from external device, or output 3.3V signal to the external device. You can also program a customized GPIO application, and you can implement it with the SDK included in the Eddy development kit.
After changing values, you need to click 'Submit' button. Then you will see the same page with modified values. Please note that you have to 'Save & Reboot' in order to see these changes in effect. Changes will be discarded if you do not save current settings.

Menu	Default	Descriptions
Device Select	Eddy	Set the GPIO port to current pin's I/O mode. Eddy: Set Eddy defined mode. GPIO: Set only GPIO port mode. User: Set only user mode.
Value	Output(Low)	Select the GPIO port to the specified mode. Input(Pullup): Standby with setting the GPIO to Vcc. Input(Pulldown): Standby with setting the GPIO to Gnd. Output(Low): 3.3V is not flowed through the port. Output(High): 3.3V is output through the port.

Eddy means real-time

[Peripheral Settings]

Device Name: Eddy
Logged in as eddy
Logout

Setup Menu

Summary
Network Settings
Peripheral Settings
Serial Settings
DIO Settings
SNMP Settings

Change Password
Update Firmware
Factory Default

Save & Reboot

Device	Select	Port No.	Value	Eddy Peripheral	User Peripheral
Serial 1 (RS-232)	Eddy	B-04	Output (Low)	TxD	
		B-05	Output (Low)	RxD	
		B-22	Output (Low)	DSR	Image Sensor Data2
		B-23	Output (Low)	DCD	Image Sensor Data3
		B-24	Output (Low)	DTR	Image Sensor Data4
		B-25	Output (Low)	RI	Image Sensor Data5
		B-26	Output (Low)	RTS	Image Sensor Data6
		B-27	Output (Low)	CTS	Image Sensor Data7
Serial 2 (RS-232)	Eddy	B-06	Output (Low)	TxD	TC Ch1 External CLK In
		B-07	Output (Low)	RxD	TC Ch2 External CLK In
		B-28	Output (Low)	RTS	Image Sensor Data Clock
		B-29	Output (Low)	CTS	Image Sensor Vertical Sync
Serial 3 (Combo)	Eddy	A-04	Output (Low)	RTS	LED Control(A-04)
		A-05	Output (Low)	CTS	LED Control(A-05)
		B-08	Output (Low)	TxD	
		B-09	Output (Low)	RxD	
Serial 4 (Combo)	Eddy	B-10	Output (Low)	TxD	Image Sensor I/F
		B-11	Output (Low)	RxD	Image Sensor I/F
		C-08	Output (Low)	RTS	Chip Select 4
		C-10	Output (Low)	CTS	Address Bus
Debug Port	Eddy	B-14	Output (Low)	RxD	
		B-15	Output (Low)	TxD	
Analog Digital Converter	Eddy	C-00	Output (Low)	ADC Ch0	USARTx Serial Clock
		C-01	Output (Low)	ADC Ch1	Program Clock Output 0
		C-02	Output (Low)	ADC Ch2	Program Clock Output 1
		C-03	Output (Low)	ADC Ch3	SP1 Chip Select 3
EEPROM (SPI)	Eddy	B-00	Output (Low)	EERPOM	SPI1 Master In Slave Out
		B-01	Output (Low)	EERPOM	SPI1 Master Out Slave In
		B-02	Output (Low)	EERPOM	SPI1 Serial Clock
		B-03	Output (Low)	EERPOM	SPI1 Chip Select 0
LAN	Eddy	C-12	Output (Low)	Chip Select	Chip Select 7
		C-15	Output (Low)	Interrupt Input	Ext. Interrupt in 1
NAND Flash	Eddy	C-14	Output (Low)	Chip Select	External Interrupt Input 2
		C-17	Output (Low)	Ready/Busy	SPI0 Chip Select 3
LED	Eddy	C-04	Input (PullDown)	Ready LED	Address Bus
Reset	Eddy	C-16	Output (Low)	Reset/Factory	SPI0 Chip Select 2
Data bus	GPIO	C-13	Output (Low)	Data bus enable	Chip Select 6
LCD	Eddy	C-09	Output (Low)	LCD Chip Select	Ch0 I/O Line B
I2C GPIO	Eddy	B-16	Output (Low)	16 bit BUS Init	TC Ch4 Ext. CLK In
User Peripheral Interface	GPIO	B-12	Output (Low)	Serial Port 5(Tx), Image Sensor I/F	
	GPIO	B-13	Output (Low)	Serial Port 5(Rx), Image Sensor I/F	
	GPIO	B-17	Output (Low)	SSC Transmit Frame Sync, TC ch4 Ext CLK IN	
	GPIO	B-18	Output (Low)	SSC Transmit Data, TC ch4 I/O B	
	GPIO	B-19	Output (Low)	SSC Receive Data, TC ch5 I/O B	
	GPIO	B-20	Output (Low)	SSC Receive Clock, Image Sensor Data 0	
	GPIO	B-21	Output (Low)	SSC Receive Frame Sync, Image Sensor Data 1	
	GPIO	B-30	Output (Low)	Pgmm Clk Output 0, Image Sensor Horizontal Sync	
	GPIO	B-31	Output (Low)	Pgmm Clk Output 1, Image Sensor Reference Clk	
	GPIO	C-05	Output (Low)	Address Bus, SPI1 Perripheral Chip Select 1	
	GPIO	C-18	Output (Low)	Data Bus, SPI1 Perripheral Chip Select 1	
	GPIO	C-19	Output (Low)	Address Bus, SPI1 Perripheral Chip Select 2	
	GPIO	C-20	Output (Low)	Data Bus, SPI1 Perripheral Chip Select 3	
	GPIO	C-21	Output (Low)	Data Bus, Ethernet(LAN) Force 100Mbit/sec.	
	GPIO	C-22	Output (Low)	Data Bus,TC ch5 External CLK IN	
	GPIO	C-23	Output (Low)	Data Bus	
	GPIO	C-26	Output (Low)	Data Bus	

Submit   Cancel

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5.6   SNMP Settings

You can set the communication and operation environment for the SNMP Agent. After changing values, you need to click 'Submit' button. Then you will see the same page with modified values. Please note that you have to 'Save & Reboot' in order to see these changes in effect. Changes will be discarded if you do not save current settings.

In order to use the SNMP Agent, SNMP v1/v2/v3 Agent become enabled and pushes the [Submit] button.

Feature	Default	Descriptions
SNMP v1/v2/v3 Agent	Disable	Enable or disable Simple Network Management Protocol (SNMP) support. (Options : Disable/Enable)
V1/2 Attribution	ReadOnly	SNMP V1/2 Attributes can read and write by SNMP Agent. In order to read attributes only, change the feature to "ReadOnly". In order to read and write attributes, change the feature to "ReadWrite". (Options : ReadOnly/ ReadWrite)
V3 Attribution	ReadOnly	SNMP V3 Attributes can read and write by SNMP Agent. In order to read attributes only, change the feature to "ReadOnly". In order to read and write attributes, change the feature to "ReadWrite". (Options : ReadOnly/ ReadWrite)
V3 Username/ Password	eddy/administrator	Configure the Username and the password when use SNMP V3. The Password is at least 8 character string
TRAP IP/ Port	0.0.0.0/162	Configure the server IP address and Port which receive the TRAP information.
System reset notification	Enable	If Enable is selected, inform the "System reset info." (Option : Enable, Disable)
Port connect notification	Disable	If Enable is selected, inform the "Serial Port opened info." (Option : Enable, Disable)
Port disconnect notification	Disable	If Enable is selected, inform the "Serial Port Closed info." (Option : Enable, Disable)

5.7 Change Password

Change Web/Telnet access username and password. After changing values, you need to click 'Submit' button. Then you will see the same page with modified values. Please note that you have to 'Save & Reboot' in order to see these changes in effect. Changes will be discarded if you do not save current settings.

◆ Default user id   : eddy
◆ Default password : 99999999

5.8 Update Firmware

Firmware is an application embedded in Flash memory of Eddy. Set the location of the firmware file to update, using the 'Browse…' button. The selected firmware will be transferred to Eddy when you click 'Start Update'. After the transmission is complete, Eddy will be automatically restarted to operate with the new firmware.
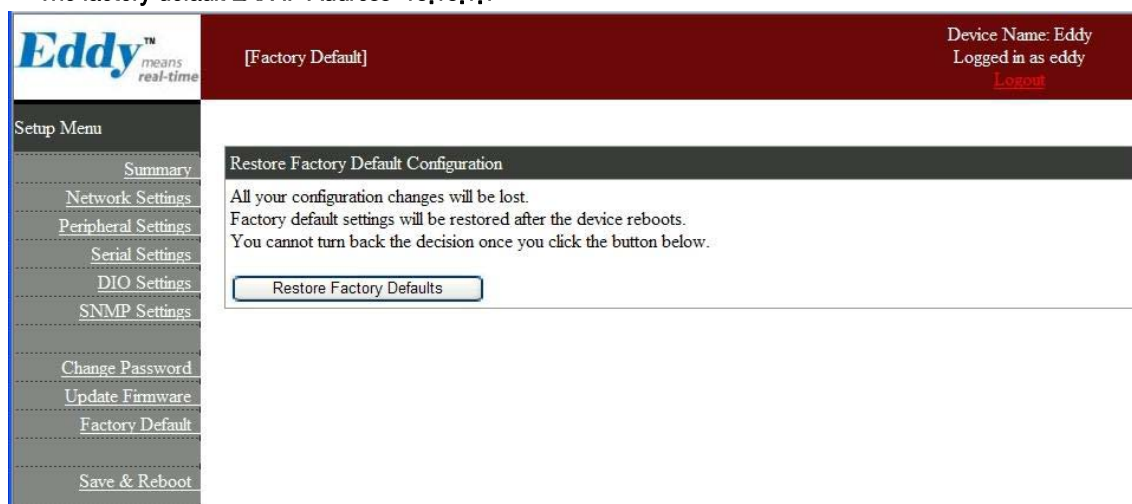
5.9 Factory Default

Restore all the configuration parameters to the factory default values. Clicking on 'Restore Factory Defaults' button will delete all current settings and restore settings to the initial status. Eddy will automatically reboot.

You cannot turn back the decision once you select this option.

◆ The factory default WAN IP Address: 192.168.0.223
◆ The factory default LAN IP Address: 10.10.1.1

5.10 Save & Reboot

This option saves changes to the Flash memory and restarts the system to let the changes to take place in the operation.

Main features for Save & Reboot are as follows

Menu	Descriptions
Save and Reboot	'Save & Reboot' reboots Eddy after saving changes to Flash memory.
Reboot Only	'Reboot Only' option just reboots Eddy without saving changes. This option can be used to rollback the changes you have mistakenly made.

Chapter 6.　Configuration via Telnet

6.1　Connection

Open your telnet client and enter Eddy's IP address to connect. You need to enter appropriate username and password to login. Please note that this username and password is used as authentication method for Web as well. This means if username or/and password has been modified from the telnet interface, modified values have to be entered to connect to web, and vice versa.

◆ Factory default username　　: eddy
◆ Factory default password　　: 99999999
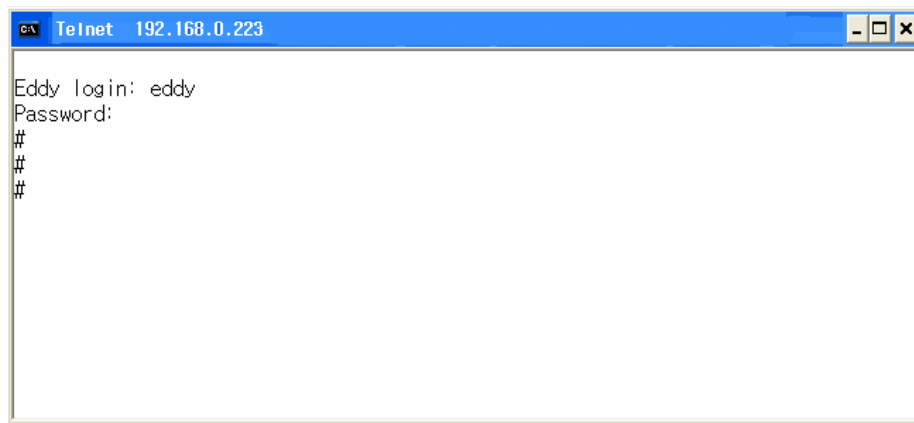
Connection via Telnet

[def] command - you can view or configure Eddy's settings
[def help] command - you can see help for [def] command

After changing values, you can see modified values with [def view] commands. But be careful because these values are not in effect unless you issue a [def save] command. Changes will be discarded if you do not save current settings.

6.2   View commands

Commands related to View are as follows.

Commands	Descriptions
def view	Show all information about Eddy.
def view wan	Show WAN network settings.
def view lan	Show LAN network settings.
def view management	Show managing items settings.
def view port	Show serial port settings.
def view gpio	Show GPIO pin settings.
def view dio	Show DIO pin settings.
def help	Show command list and help.

6.3   Network commands

Configure general network environment and network management.

Commands	Default	Descriptions
def mac 〈Mac Address〉	00:05:f4:00:20:57	Register Eddy's MAC address.
def line [ip/dhcp]	Static IP	IP obtaining method for Eddy's network connection.
def ip 〈IP Address〉	192.168.0.223	Set the current IP address Eddy is assigned to. When line type is Static IP, manually enter an appropriate IP address. When line type is DHCP, it is not editable. Instead, current IP address is shown.
def mask 〈Subnet mask〉	255.255.255.0	Set the subnet mask Eddy is assigned to. When line type is Static IP, manually enter an appropriate subnet mask. When line type is DHCP, it is not editable. Instead, current subnet mask is shown.
def gateway 〈Gateway address〉	192.168.0.1	Set the default gateway Eddy is assigned to. When line type is DHCP, it is not editable. Instead, current gateway address is shown.

def dns 〈IP address〉	168.126.63.1	Set the Domain Name Service IP address.
def portviewip 〈IP address〉	0.0.0.0	Configures IP of PC which Portview is installed If IP is set to 0.0.0.0, NMS feature is disabled. (Please refer to Portview User's Manual for detailed information.)
def portviewport 〈Port Number〉	4000	Set the socket number of the PC with Portview installed.
def telnet [Enable / Disable]	Enable	Enable or disable Telnet service. If disabled, you cannot connect to Eddy via Telnet.
def ftp [Enable / Disable]	Enable	Enable or disable FTP service. If disabled, you cannot connect to Eddy via FTP.
def ssh [Enable / Disable]	Disable	Enable or disable SSH service. If enabled, you can connect to Eddy via SSH.
Def ddns [IP Address]	203.32.117.1	If you set DDNS server IP , DDNS service will be enable. But you set "0.0.0.0" ,this service will disable.
Def ddnsuser [username]	eddy	You can access DDNS server with this ID.
Def ddnspass [password]	99999999	You can access DDNS server with this password.
def web [Enable / Disable]	Enable	Enable or disable Web service. If disabled, you cannot connect to Eddy via Web.
def target_agent [Enable / Disable]	Disable	Enable or disable remote debugging function used by Eddy development environment, LemonIDE. For more information, please refer to LemonIDE user manual in the SDK CD included in Eddy-DK package.
def name 〈Eddy name〉	Name of the module	Set the name of Eddy module. (Max 32 bytes)
def snmp [Enable / Disable]	Disable	SNMP V1/2 Attributes can read and write by SNMP Agent. In order to read attributes only, change the feature to "ReadOnly." In order to read and write attributes change the feature to "ReadWrite." (Options : ReadOnly/ ReadWrite)
def v1readwrite [enable, disable]	Disable	SNMP V1/V2 Attributes can read and write by SNMP Agent. In order to read attributes only change the feature to "ReadOnly."

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		In order to read and write attributes change the feature to "ReadWrite." (Options : ReadOnly/ ReadWrite)
def v3readwrite [enable, disable]	Disable	SNMP V3 Attributes can read and write by SNMP Agent. In order to read attributes only change the feature to "ReadOnly." In order to read and write attributes change the feature to "ReadWrite." (Options : ReadOnly/ ReadWrite)
def v3username [string]	eddy	Configure the Username when use SNMP V3.
def v3password [string]	none	Configure the password when use SNMP V3.
def trapip [address]	0.0.0.0	Configure the server IP address which receives the TRAP information.
def trapoprt [Socket No.]	162	Configure the server Port which receives the TRAP information.
def trap_reset [enable, disable]	Enable	If Enable is selected, inform the "System reset info".
def trap_connect [enable, disable]	Disable	If Enable is selected, inform the "Serial Port opened info".
def trap_disconnect [enable, disable]	Disable	If Enable is selected, inform the "Serial Port Closed info".
def landhcp [enable, disable]	Enable	If Enable is selected, DHCP server service will be enabled on the LAN port.
def lanip 〈IP Address〉	10.10.1.1	Set the IP address on the LAN port.
def lanmask 〈Subnet Mask〉	255.255.255.0	Set the subnet mask address on the LAN port.
def lanstart 〈IP Addrss〉	10.10.1.2	Set the start address for the DHCP range on the LAN port.
def lanend 〈IP Address〉	10.10.1.30	Set the end address for the DHCP range on the LAN port.
def leasetime 〈msec〉	180	Set lease time for DHCP.

6.4 Serial Commands

You can set the communication and operation environment for the serial port. Chapter 5 describes each option in detail. Only a summary of each option is presented here.

Commands	Default	Descriptions
def port 1 protocol [disable / com/ tcp_server/tcp_client/ tcp_broadcast / tcp_multiplex/ udp_server/udp_client]	com	Select the operation protocol, which the serial port would use.
def port 1 socket 〈port number〉	4001	Set the socket number for the port. TCP Server, TCP Broadcase, TCP Multiplex, and UDP server operation modes make use of this port for awaiting network socket connections.
def port 1 name 〈name〉	Port 1	Port alias name for convenience. 16 Characters at maximum
def port 1 speed [150/300/600/1200/2400/4800/9600/19200/38400/57600/ 115200/230400/460800 /921600]	9600bps	Set communication speed.
def port 1 data [5 / 6 / 7 / 8]	8	Set the number of bits in each character size.
def port 1 stop [1 / 2]	1	Set the number of stop bits.
def port 1 parity [none/odd/even]	none	Set parity bit check scheme.
def port 1 flow [none/xon/rts]	none	Set the flow control scheme.
def port 1 signal [data/modem]	data	Set the signal line checking method for the device to be connected to the given serial port.
def port 1 remote 〈IP address〉	0.0.0.0	When the Operation Mode is set to TCP Client or UDP Client, set the IP address to connect to.
def port 1 remoteport 〈socket number〉	4000	When the Operation Mode is set to TCP Client or UDP Client, set the socket number to connect to.
def port 1 keepalive 〈0 ~ 65535〉	0	After a certain amount of time passes without any communication after the socket connection between the given serial port and the server is established, automatically disconnect the socket connection.
def port 1 latency 〈msec〉	180	This needs to be set when consecutive data from the given serial port needs to be transmitted to socket at once.
def port 1 login [Enable / Disable]	Disable	When the Operation Mode is set to TCP Server, ask for the username and password when the client tries to connect. Set to 1 to enable.
def port 1 loginname 〈username〉	None	When the Operation Mode is set to TCP Server, set the username to ask for(Max 8 bytes)
def port 1 loginpass 〈password〉	None	When the Operation Mode is set as TCP Server, set the password to ask for(Max 8 bytes)

6.5 Username/Password Commands

Configure username and password for Web/Telnet/FTP.

Commands	Default	Descriptions
def username 〈username〉	eddy	Set username to use in Web, Telnet, or FTP. 16 Characters at maximum.
def password 〈password〉	99999999	Set password to use in Web, Telnet, or FTP. 16 Characters at maximum.

6.6 System Commands

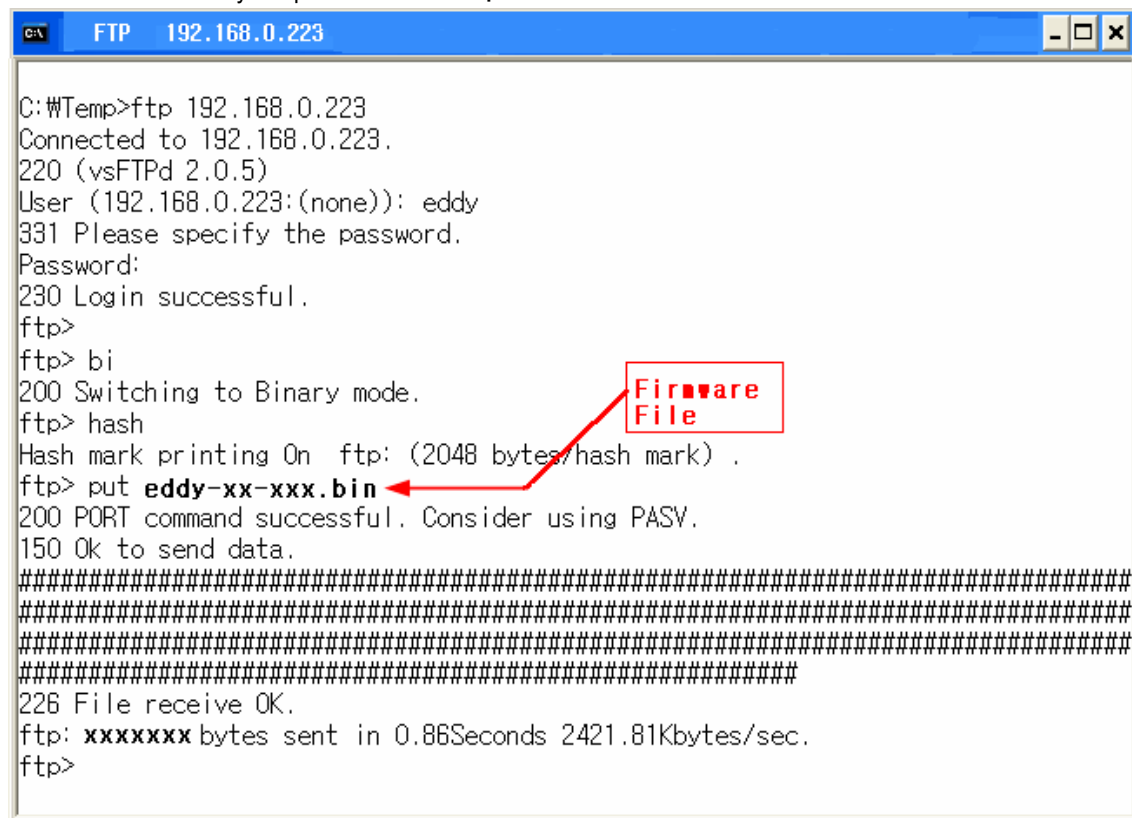| Commands	Descriptions
def default	Restore all settings to factory default. Requires reboot for changes to take effect.
def save	Save current configuration settings. Requires reboot for changes to take effect.
reboot	Reboot Eddy.

Chapter 7. Appendix

7.1 Firmware Updates via FTP

Eddy supports firmware update with Web or FTP. This section describes update method via FTP and Telnet. Web update is described in Chapter 5. Configuration via Web.

1) Connect to Eddy with FTP, using correct username and password. (Default: eddy, 99999999)
2) Issue a command 'bin' for binary file transfer mode. Optionally use 'hash' to see the data transfer mark.
3) Issue 'put' command upload the firmware file.
4) After getting a 'Transfer complete' message, issue a command 'quit' or 'bye' to disconnect. Now we are ready to update the firmware.

```
FTP    192.168.0.223

C:\Temp>ftp 192.168.0.223
Connected to 192.168.0.223.
220 (vsFTPd 2.0.5)
User (192.168.0.223:(none)): eddy
331 Please specify the password.
Password:
230 Login successful.
ftp>
ftp> bi
200 Switching to Binary mode.
ftp> hash
Hash mark printing On  ftp: (2048 bytes/hash mark) .
ftp> put eddy-xx-xxx.bin        <--- Firmware File
200 PORT command successful. Consider using PASV.
150 Ok to send data.
####################################################################################
####################################################################################
####################################################################################
####################################################
226 File receive OK.
ftp: xxxxxxx bytes sent in 0.86Seconds 2421.81Kbytes/sec.
ftp>
```

Firmware updates via FTP

5) Connect to Eddy with Telnet, using correct username and password. (Default: eddy, 99999999)
6) After the login, you are already at the default directory where the firmware resides. Update can start right away.
7) Issue a command 'ls' to make sure firmware files are both successfully uploaded.
8) Use 'upgrade' command to write this file into Eddy's Flash memory. Upgrade application automatically detects whether the given firmware is kernel or file system.
9) Usage: upgrade ⟨firmware filename⟩ (Filename is case-sensitive.)
10) Make sure 'Flash Write OK' and 'Flash Verify OK' messages are displayed.
11) Enter 'reboot' to restart Eddy. Now Eddy will run with the new firmware.

7.2 Ordering Information

Product	Descriptions
Eddy CPU v2.1	Embedded CPU Module v2.1
Eddy DK v2.1	Eddy V2.1 Development Kit

7.3 FCC Statement

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC FULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:
1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE.
2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED.
3) INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

FCC RF
INTERFERENCE STATEMENT

NOTE:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.
Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.